

### **REMARKS/ARGUMENTS**

Reconsideration and withdrawal of the rejections set forth in the Office Action dated December 8, 2006 is respectfully requested in view of this amendment. By this amendment, claims 30 and 37-40 have been amended; claims 1-29, 32-35 and 42-47 have been cancelled; and claim 48 has been newly added. Accordingly, claims 30, 31, 34-41 and 48 are currently pending in this application. It should be noted that claims 1-29, 32-33 and 42-47 have been cancelled as directed to unelected claims. The applicant reserves the right to resubmit these claims in one or more divisional applications.

The present amendment is in response to the Office Action received on December 8, 2006, in which Claims 30, 31, and 34-41 were rejected. Applicant has thoroughly reviewed the outstanding Office Action including the Examiner's remarks and the reference cited therein. The following remarks are believed to be fully responsive to the Office Action and render all claims at issue patentably distinguishable over the cited references.

In view of the above amendments and the remarks set forth below, Applicant respectfully requests reconsideration and allowance of the present application.

#### **Claims rejections under 35 U.S.C. § 102/103**

The Examiner has rejected claims 30, 31 and 34-41 as being anticipated, or in the alternative obvious, in view of U.S. Patent No. 6,417,025 to Gengel.

Referring to column 4, lines 28-30 and FIG. 4B of Gengel, substrate 402 is recessed to form receptor regions 408 into which functional components will assemble through fluidic self-assembly (FSA). In one embodiment (see column 4, lines 34-42 of Gengel), the receptor regions 408 may be formed through the first dielectric layer 404 using a hot stamp process so that the thermally conductive layer 406 is exposed at the bottom of the receptor region 408. In other embodiments, the receptor regions 408 may be formed using a template punch, or laser, chemical or plasma etching, a cast, or impact extrusion. In other words, the shape of the functional components 410 need to be complementary with that of the receptor regions 408. Moreover, referring to column 3, lines 1-4 of Gengel, the functional components 410 are deposited in the

receptor regions using fluidic self-assembly such that the wired side of the functional component is facing outward from the receptor region. In other words, the functional components 410 are employed by a fluid flowing over the substrate, and by the recessed receptor regions for receiving the functional components 410.

Referring to column 8, lines 9-25 and FIGS. 7-8 of Gengel, die 714 has four sides 764. Each side 764 extends from a respective edge 766 to respective edge 768 of a periphery of the lower surface 754. A respective side 764 extends at an angle with respect to vertical so that the side 764 extends from the periphery 766 downwardly and under the surface 756 towards the edge 768. Opposing ones of the sides 768 thus extend downwardly and towards one another. Extensions of the sides 764 will meet at a point below the surface 754. As such, the die 714 has an inverted frustum-pyramidal shape with a square base. The shape of the opening 728 is in all respects substantially complementary to the shape of the die 714. When the die 714 falls into the opening 728, as shown in FIG. 9, the lower surface 754 is located against the lower surface 738 and the sides 764 contact the sides 742. The upper surface 756 is then substantially flush with the upper surface 726. The semiconductor package is thereafter finally manufactured as shown in FIG. 4N.

The substrate of the prior art includes a cavity (i.e., receptor regions 408) to receive the die. The receptor regions 408 must have a slope profile to fit the shape of the functional components 410, which also has a slope profile that is complementary with that of the receptor regions (i.e., cavity) 408 for fluidic self-assembly (FSA).

The functional components 410 of the prior art are deposited in the receptor regions using fluidic self-assembly such that the wired side of the functional component are facing outward from the receptor region.

By contrast, a die is adhered on a base in the claimed invention. There is no recess or cavity in the substrate of the claimed invention. Furthermore, in the claimed invention the first dielectric layer is formed on the base without die receptor regions (i.e., cavity) and fills in a space except the die on the base. Thus, the dielectric layer of the claimed invention does not include any die reception cavity or reception region formed therein. It is further noted that the slope profile of the cavity is also not found in the claimed invention.

In addition to the foregoing, in the claimed invention the die is formed on the base instead of in a receptor, since there is no receptor region formed in the base. The die of the prior art is refilled into the receptor region (i.e., cavity).

The die of the prior art is deposited in the receptor (i.e., cavity) by using fluidic assembly. However, the sawed die of the claimed invention is arranged on the base by a picking and placing system. Fluidic assembly is complicated and raises many issues, including alignment, use of a special base with receptor region (cavity), and use of a customized die with inverted frustum-pyramidal shape. Therefore, the claimed invention can solve several problems of the prior art simultaneously.

Furthermore, the die of the claimed invention is sawed from a wafer and each sawed die is arranged on the base by a picking and placing system, as defined by newly added claim 48. The invention as defined by new claim 48 also includes a "sawed die." According to the present invention, the die sawed by a normal dicing process provides a substantially vertical slope for the die. Referring to the specification of the present application, the die is formed by sawing a processed base and the processed base is back lapped to obtain a thickness of the processed base around 50-300  $\mu$ m.

Furthermore, the die of the present invention is a rectangular shape chip instead of an inverted frustum-pyramidal shape that is complementary with that of receptor regions, as disclosed in Gengel. In Gengel, a respective side 764 extends at an angle with respect to vertical, so that the side 764 extends from the periphery 766 downwardly and under the surface 756 towards the edge 768. Die 714 has an inverted frustum-pyramidal shape with a square base. The shape of the opening 728 is in all respects substantially complementary to the shape of the die 714. The prior art fails to teach the rectangular shaped die of the claimed invention. It is noted that the present invention may omit the cavity in the base, since the present invention does not use the inverted frustum-pyramidal shape for alignment, therefore, simplifying the manufacturing processes. The claimed structure is simpler than the prior art and the present invention can avoid the alignment issue of the prior art that is caused by the inverted frustum-pyramidal shape having a slope profile.

It is respectfully submitted that the claimed invention is not anticipated by the prior art and the claimed structure provides unexpected results over the inverted frustum-pyramidal shape of the prior art structure.

In the present invention, the first material layer can be formed of a UV curing type material or a heat curing type material. The first material layer may be formed by a screen printing method or a photolithography method. The first material layer functions as a buffer layer to reduce stress due to temperature, etc. The first material layer can be a UV and/or heat cured material, such as silicon rubber, epoxy, resin, BCB, and the like. Gengel discloses that the material of layer 404 is oxide, polyethersulfone, polysulfone. Therefore, the claimed invention is not anticipated by the prior art, and the structure of the present invention provides unexpected result over the prior art.

The package structure of the present invention has two separate layers including a contact conductive layer and a conductive line. The dual layer is not only for separating one step into two. Therefore, the Applicant respectfully disagrees with the Examiner's arguments. The conductive line is formed on the contact conductive layer after forming the contact conductive layer. The contact conductive layer contacts the pads directly instead of the first conductive line to act as a buffer or barrier between these materials. The preferable material of the contact conductive layer is Ti, Cu, or a combination thereof. The conductive lines are preferably Cu, Ni, Au, or a combination thereof. Thus, the contact conductive layer may be employed as a buffer and enhance the adhesion between the conductive lines and the pads.

The prior art fails to teach or suggest the structure of the claimed invention and thus does not achieve the function of a "barrier" layer for pads of the present invention. Furthermore, the conductive lines of the present invention substantially fill the opening of the dielectric. However, the prior art does not disclose such features, with reference to FIG. 4H. In this respect, the prior art leaves a gap between the lines. As a result, the gap will cause a parasite capacity, mechanical strength and cross talk issues.

Furthermore, the bump of the present invention is formed on a conductive line. However, the prior art locates the bump adjacent to a conductive line. It is respectfully submitted that the prior art structure is more difficult to achieve than the structure of present invention.

In conclusion, Gengel fails to teach or suggest significant features of the claimed invention. Furthermore, Gengel does not teach, suggest or motivate the claimed features of the applicant's invention, including "a contact conductive layer formed... within said opening to electrically couple with the pads," as set forth in claim 30. Therefore, it is respectfully submitted that independent claim 30 is patentable in view of the cited reference.

Since the remaining claims depend from claim 30, it is respectfully submitted that these claims are likewise patentable upon the patentability of claim 30.

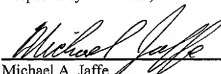
In view of the foregoing, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102/103 is respectfully requested.

It is respectfully submitted that the present application is now in proper condition for allowance. If the Examiner believes there are any further matters that need to be discussed in order to expedite the prosecution of the present application, the Examiner is invited to contact the undersigned.

If there are any fees necessitated by the foregoing communication, please charge such fees to our Deposit Account No. 50-0537, referencing our Docket No. HK9225US.

Respectfully submitted,

Date: March 5, 2007

  
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